Cypress Semiconductor Corporation – An Infineon Technologies Company
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PRODUCT CHANGE NOTIFICATION

PCN:PCN201703 **Date:** April 22, 2020

Subject: Qualification of a Design Revision for 2-Mbit (256K x 8) Serial (SPI) F-RAM Products

To: FUTURE ELECTRONICS
FUTURE ELE
pcn.system2@future.ca

Description of Change:
Cypress announces the qualification of a new design revision for select 2-Mbit (256K x 8) Serial (SPI) F-RAM products. The new design revision incorporates the advantages of Cypress' leading serial non-volatile random-access memory platform, Excelon™, to the current 2-Mbit SPI F-RAM products. Migration to the new die revision will result in customers benefitting from continuing product supply and long-term technical support on these products.

This design change does not affect the device's guaranteed datasheet specifications or electrical performance. There is no change to existing marketing part numbers.

Benefit of Change:
This qualification has improved product availability and is consistent with Cypress' product roadmap of offering the latest F-RAM technology and technical support to customers.

Part Numbers Affected: 6
See the attached 'Affected Parts List' file for a list of all part numbers affected by this change. Note that any new parts that are introduced after the publication of this PCN will include all changes outlined in this PCN.

Qualification Status:
This improved die revision has been qualified through a series of tests documented in the Qualification Test Plan QTP#193412. This qualification report can be found as an attachment to this PCN or by visiting www.cypress.com and typing the QTP number in the keyword search window.

Sample Status:
Qualification samples may not be built ahead of time for all part numbers affected by this change. Please review the attached 'Affected Parts List' file for a list of affected part numbers with their associated sample ordering part numbers. If you require qualification samples, please contact your local Cypress Sales Representative as soon as possible, preferably within 30 days of the date of this PCN, to place any sample orders.

Approximate Implementation Date:
Effective 90 days from the date of this notification or upon customer approval, whichever comes first, all shipments of Commercial, Industrial and Automotive non-PPAP part numbers in the attached file will be designed with new die revision or other approved die revision.

Anticipated Impact:
None anticipated. Products manufactured with the new design revision are completely compatible with existing product from form, fit, functional, parametric, and quality performance perspectives.

Cypress also recommends that customers take this opportunity to review these changes against current application notes, system design considerations and customer environment conditions to assess impact (if any) to their application.

Method of Identification:
Cypress maintains traceability of product to wafer level, including wafer fabrication location, through the lot number marked on the package.

Response Required:
No response is required.

For additional information regarding this change, contact your local sales representative or contact the PCN Administrator at pcn_adm@cypress.com.

Sincerely,

Cypress PCN Administration

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Cypress Semiconductor
Product Qualification Report

QTP# 193412 VERSION **
April 2020

2Mb Industrial Excelon Ultra/LP Serial F-RAM Product Family 130nm DMOS6 1T1C Technology, TI 300mm Wafer Fab 130nm S8 Technology, Fab 25 200mm Wafer Fab	
CY15B102Q* **CY15V102Q***	**2-Mbit 3V SPI F-RAM Device** **2-Mbit 1.8V SPI F-RAM Device**

FOR ANY QUESTIONS ON THIS REPORT, PLEASE CONTACT
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PRODUCT QUALIFICATION HISTORY

QTP Number	Description of Qualification Purpose	Date
182403	Qualification of CY15*104QN-*SXA (4Mb Industrial/ Auto-A) in 2-Die Stack 8-SOIC package using 130nm DMOS6 1T1C Technology at TI 300mm Wafer Fab and 130nm S8 Technology at Fab25 200mm Wafer Fab	April 2019
182901	Qualification of CY15*104Q* (4Mb Industrial/Commercial) Device in 2-Die Stack 8-SOIC and 8-GQFN packages using 130nm DMOS6 1T1C Technology at TI 300mm Wafer Fab and 130nm S8 Technology at Fab25 200mm Wafer Fab	June 2019
193412	Qualification of CY15*102Q* (2Mb Industrial/Commercial) Device in 2-Die Stack 8-EIAJ,8-PDIP and 8-TDFN packages using 130nm DMOS6 1T1C Technology at TI 300mm Wafer Fab and 130nm S8 Technology at Fab25 200mm Wafer Fab	April 2020

PRODUCT DESCRIPTION	
Qualification Purpose:	Qualification of CY15*102Q* (2Mb Industrial) Device in 2-Die Stack 8-EIAJ, 8- PDIP and 8-TDFN packages using 130nm DMOS6 1T1C Technology at TI 300mm Wafer Fab and 130nm S8 Technology at Fab 25 200mm Wafer Fab
Marketing Part #:	CY15B102Q*, CY15V102Q*
Device Description:	2-Mbit (256Kb X 8) SPI F-RAM Memory Device
Cypress Division:	Cypress Semiconductor Corporation – Memory Products Division (MPD)

TECHNOLOGY/FAB PROCESS DESCRIPTION			
Number of Metal Layers:	Proprietary*	Metal Composition:	Proprietary*
Passivation Type and Thickness:			Proprietary*
Generic Process Technology/Design Rule (µ-drawn):			130nm
Gate Oxide Material/Thickness (MOS):			Proprietary*
Name/Location of Die Fab (prime) Facility:			Texas Instruments / Dallas & Fab25 / Austin
Die Fab Line ID/Wafer Process ID:			DMOS 6 / E035.1 & S8

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	8-EIAJ
Package Outline, Type, or Name:	001-85261, SOIC 208 mils, 8 Leads
Mold Compound Name/Manufacturer:	EME-G770 / Sumitomo
Mold Compound Flammability Rating:	V0 UL94
Mold Compound Alpha Emission Rate:	Standard
Substrate Material:	N/A
Solder Ball Finish, Composition / Thickness:	N/A
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	Laser Groove + Mechanical Saw
Die Attach Supplier:	Hitachi
Die Attach Material:	HR-5104
Bond Diagram Designation	002-28220
Wire Bond Method:	Thermosonic
Package Cross Section Yes/No:	Yes
Assembly Process Flow:	001-85398
Name/Location of Assembly (prime) facility:	UTAC-Thailand (UT)
MSL Level	3
Reflow Profile	260C

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	UTAC-Thailand (UT)

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	8- PDIP
Package Outline, Type, or Name:	51-85075, PDIP 300 Mils, 8 Leads
Mold Compound Name/Manufacturer:	EME-G770 / Sumitomo
Mold Compound Flammability Rating:	V0 UL94
Mold Compound Alpha Emission Rate:	Standard
Substrate Material:	N/A
Solder Ball Finish, Composition / Thickness:	N/A
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	Laser Groove + Mechanical Saw
Die Attach Supplier:	Hitachi
Die Attach Material:	HR-5104
Bond Diagram Designation	002-28226
Wire Bond Method:	Thermosonic
Package Cross Section Yes/No:	Yes
Assembly Process Flow:	001-85398
Name/Location of Assembly (prime) facility:	UTAC-Thailand (UT)
MSL Level	3
Reflow Profile	260C

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	UTAC-Thailand (UT)

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	8-TDFN
Package Outline, Type, or Name:	001-50671, TDFN 5x6x0.75mm, 8 Leads
Mold Compound Name/Manufacturer:	EME-G770 / Sumitomo
Mold Compound Flammability Rating:	V0 UL94
Mold Compound Alpha Emission Rate:	Standard
Substrate Material:	N/A
Solder Ball Finish, Composition / Thickness:	N/A
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	Laser Groove + Mechanical Saw
Die Attach Supplier:	Hitachi
Die Attach Material:	HR-5104
Bond Diagram Designation	002-28224
Wire Bond Method:	Thermosonic
Package Cross Section Yes/No:	Yes
Assembly Process Flow:	001-85398
Name/Location of Assembly (prime) facility:	UTAC-Thailand (UT)
MSL Level	3
Reflow Profile	260C

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	UTAC-Thailand (UT)

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS

Stress/Test	Test Condition (Temp/Bias)	Result P/F
Electrostatic Discharge Charge Device Model (ESD-CDM)	JESD22-C101 500V/750V/1000V/1250V/1500V/1750V/2000V	P
Electrostatic Discharge Human Body Model (ESD-HBM)	JESD22-A114 1100V/2200V/3300V/4000V/5000V/6000V/7000V/8000V	P
High Temperature Operating Life Early Failure Rate	JESD22-A108, 125°C Dynamic Operating Condition, Vcc = 3.6V	P
High Temperature Operating Life Latent Failure Rate	JESD22-A108, 125°C Dynamic Operating Condition, Vcc = 3.6V	P
Static Latch-up	JESD78 85°C, +/- 140mA, +/- 200mA 125°C, +/-100mA, +/-140mA	P
Endurance Test	Per Datasheet, MIL-STD-883, Method 883-1033	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF[3]	Failure Rate
High Temperature Operating Life Early Failure Rate	13,195 Devices	0	N/A	N/A	0 PPM [1]
High Temperature Operating Life Long Term Failure Rate	667,000 DHRs	0	0.7	55	25 FIT [2]

[1]Early Failure Rate was computed from QTP# 182403 and QTP# 193412.
[2]Long Term Failure Rate was computed from QTP# 182403, QTP# 182901 and QTP# 193412 LFR Data.

[1] Assuming an ambient temperature of 55°C and a junction temperature rise of 15°C.
[2] Chi-squared 60% estimations used to calculate the failure rate.
[3] Thermal Acceleration Factor is calculated from the Arrhenius equation

$$AF = \exp\left[\frac{E_A}{k}\left[\frac{1}{T_2} - \frac{1}{T_1}\right]\right]$$

where:

E_A =The Activation Energy of the defect mechanism.
K = Boltzmann's constant = 8.62×10^{-5} eV/Kelvin.
T_1 is the junction temperature of the device under stress and T_2 is the junction temperature of the device at use conditions.

Reliability Test Data

QTP #: 182403

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 3.6V, Vcc Max)							
CY15B102QN (7A15026B3BB)	3827033	611824103	UT-Thailand	96	3185	0	
CY15B102QN (7A15026B3BB)	3832053	611829800	UT-Thailand	96	3503	0	
CY15B102QN (7A15026B3BB)	3829051	611833608	UT-Thailand	96	3507	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 3.6V, Vcc Max)							
CY15B102QN (7A15026B3BB)	3827033	611824103	UT-Thailand	1000	133	0	
CY15B102QN (7A15026B3BB)	3832053	611829800	UT-Thailand	1000	148	0	
CY15B102QN (7A15026B3BB)	3829051	611833608	UT-Thailand	1000	146	0	

Note Reconfigured 2Mb Automotive to 4Mb Industrial part for this Qualification*

Reliability Test Data

QTP #: 182901

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-HUMAN BODY MODEL PER JESD22, METHOD A114							
CY15B104QN (7C15046D3)	3844050	611840048	UT-Thailand	1100	3	0	
CY15B104QI (7C15046C3)	3844050	611840052	UT-Thailand	1100	3	0	
CY15V104QI (7C15046C1)	3844050	611840055	UT-Thailand	1100	3	0	
CY15B104QN (7C15046D3)	3844050	611840048	UT-Thailand	2200	8	0	
CY15B104QI (7C15046C3)	3844050	611840052	UT-Thailand	2200	8	0	
CY15V104QI (7C15046C1)	3844050	611840055	UT-Thailand	2200	8	0	
CY15B104QN (7C15046D3)	3844050	611840048	UT-Thailand	3300	3	0	
CY15B104QI (7C15046C3)	3844050	611840052	UT-Thailand	3300	3	0	
CY15V104QI (7C15046C1)	3844050	611840055	UT-Thailand	3300	3	0	
CY15B104QN (7C15046D3)	3844050	611840048	UT-Thailand	4000	3	0	
CY15B104QI (7C15046C3)	3844050	611840052	UT-Thailand	4000	3	0	
CY15V104QI (7C15046C1)	3844050	611840055	UT-Thailand	4000	3	0	
CY15B104QN (7C15046D3)	3844050	611840048	UT-Thailand	5000	3	0	
CY15B104QI (7C15046C3)	3844050	611840052	UT-Thailand	5000	3	0	
CY15V104QI (7C15046C1)	3844050	611840055	UT-Thailand	5000	3	0	
CY15B104QN (7C15046D3)	3844050	611840048	UT-Thailand	6000	3	0	
CY15B104QI (7C15046C3)	3844050	611840052	UT-Thailand	6000	3	0	
CY15V104QI (7C15046C1)	3844050	611840055	UT-Thailand	6000	3	0	
CY15B104QN (7C15046D3)	3844050	611840048	UT-Thailand	7000	3	0	
CY15B104QI (7C15046C3)	3844050	611840052	UT-Thailand	7000	3	0	
CY15V104QI (7C15046C1)	3844050	611840055	UT-Thailand	7000	3	0	
CY15B104QN (7C15046D3)	3844050	611840048	UT-Thailand	8000	3	0	
CY15B104QI (7C15046C3)	3844050	611840052	UT-Thailand	8000	3	0	
CY15V104QI (7C15046C1)	3844050	611840055	UT-Thailand	8000	3	0	

Reliability Test Data

QTP #: 182901

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 3.6V, Vcc Max)							
CY15B104QN (7C15046D3)	3844050	611840048	UT-Thailand	168	120	0	
CY15B104QN (7C15046D3)	3844050	611840048	UT-Thailand	1000	120	0	
STRESS: STATIC LATCH-UP (125C, 100mA)							
CY15B104QN (7C15046D3)	3844050	611840048	UT-Thailand	COMP	3	0	
CY15V104QI (7C15046C1)	3844050	611840055	UT-Thailand	COMP	3	0	
STRESS: STATIC LATCH-UP (125C, 140mA)							
CY15B104QN (7C15046D3)	3844050	611840048	UT-Thailand	COMP	2	0	
CY15V104QI (7C15046C1)	3844050	611840055	UT-Thailand	COMP	2	0	
STRESS: STATIC LATCH-UP (85C, 140mA)							
CY15B104QN (7C15046D3)	3844050	611840048	UT-Thailand	COMP	2	0	
CY15V104QI (7C15046C1)	3844050	611840055	UT-Thailand	COMP	2	0	
STRESS: STATIC LATCH-UP (85C, 200mA)							
CY15B104QN (7C15046D3)	3844050	611840048	UT-Thailand	COMP	2	0	
CY15V104QI (7C15046C1)	3844050	611840055	UT-Thailand	COMP	2	0	

Reliability Test Data

QTP #: 193412

Device	*Fab Lot #*	*Assy Lot #*	*Assy Loc*	*Duration*	*Samp*	*Rej*	*Failure Mechanism*
STRESS: ESD-CHARGE DEVICE MODEL							
CY15B102QSN (7C15026B3)	2947000	611940565	UT-Thailand	500	9	0	
CY15V102QN (7C15026D1)	2947000	611940600	UT-Thailand	500	9	0	
CY15B102QN (7C15026D3)	2947000	611941287	UT-Thailand	500	9	0	
CY15B102QSN (7C15026B3)	2947000	611940565	UT-Thailand	750	3	0	
CY15V102QN (7C15026D1)	2947000	611940600	UT-Thailand	750	3	0	
CY15B102QN (7C15026D3)	2947000	611941287	UT-Thailand	750	3	0	
CY15B102QSN (7C15026B3)	2947000	611940565	UT-Thailand	1000	3	0	
CY15V102QN (7C15026D1)	2947000	611940600	UT-Thailand	1000	3	0	
CY15B102QN (7C15026D3)	2947000	611941287	UT-Thailand	1000	3	0	
CY15B102QSN (7C15026B3)	2947000	611940565	UT-Thailand	1250	3	0	
CY15V102QN (7C15026D1)	2947000	611940600	UT-Thailand	1250	3	0	
CY15B102QN (7C15026D3)	2947000	611941287	UT-Thailand	1250	3	0	
CY15B102QSN (7C15026B3)	2947000	611940565	UT-Thailand	1500	3	0	
CY15V102QN (7C15026D1)	2947000	611940600	UT-Thailand	1500	3	0	
CY15B102QN (7C15026D3)	2947000	611941287	UT-Thailand	1500	3	0	
CY15B102QSN (7C15026B3)	2947000	611940565	UT-Thailand	1750	3	0	
CY15V102QN (7C15026D1)	2947000	611940600	UT-Thailand	1750	3	0	
CY15B102QN (7C15026D3)	2947000	611941287	UT-Thailand	1750	3	0	
CY15B102QSN (7C15026B3)	2947000	611940565	UT-Thailand	2000	3	0	
CY15V102QN (7C15026D1)	2947000	611940600	UT-Thailand	2000	3	0	
CY15B102QN (7C15026D3)	2947000	611941287	UT-Thailand	2000	3	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 3.6V, Vcc Max)							
CY15B102QSN (7C15026B3)	2947000	611940565	UT-Thailand	96	1450	0	
CY15B102QN (7C15026D3)	2947000	611939932	UT-Thailand	96	1650	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 3.6V, Vcc Max)							
CY15B102QN (7C15026D3)	2947000	611939932	UT-Thailand	1000	120	0	
STRESS: ENDURANCE + DATA RETENTION, 125C							
CY15B102QSN (7C15026B3)	2947000	611940565	UT-Thailand	CYCLING	80	0	
CY15B102QSN (7C15026B3)	2947000	611940565	UT-Thailand	168	80	0	

Document History Page

Document Title: QTP# 193412: Qualification of 2Mb Industrial/Commercial Excelon Ultra/LP Serial F-RAM Product Family 130nm DMOS6 1T1C Technology, TI 300mm Wafer Fab, 130nm S8 Technology, Fab 25 200mm Wafer Fab

Document Number: 002-30151

Rev.	ECN No.	Orig. of Change	Description of Change
**	6850635	SUZH	Initial Release